REMARKS

The above application has been amended after final pursuant to the discussion at the interview conducted on October 7, 2008, in order to place it in condition for allowance.

Applicants sincerely appreciate the withdrawal of the rejections under 35 U.S.C. § 112, paragraphs 1 and 2. Applicants further appreciate the examiner's approval and entry of Figure 3, added June 11, 2007, and the Substitute Specification, filed August 6, 2008.

Rule 1.131 Declarations of Prior Invention Predating Zimmerman 7,027,918

Reconsideration of the Rule 1.131 declarations by the inventors, including the date-stamped disclosure documenting conception of the invention, is respectfully requested. The applicants' sworn statements, considered with the documentary evidence of conception of the claimed invention prior to the effective reference date and due diligence from prior to the reference date to the application filing date (April 23, 2003), clearly comply with 37 CFR 1.131(b).

The applicable dates are as follows:

January 28, 2003 Michael Whitehead (coinventor) documentation of concept of, *inter alia*, redundant array of GPS receivers constrained on vessel (ship) with large crane and obstructing common view of all available satellites, with bearing to receiver and common clock constraint removing unknowns from position-solution equation.

April 7, 2003 Zimmerman 7,027,918 filing (effective) date

April 23, 2003 Present application filing date.

The evidence of prior invention was considered insufficient because the solutions described in the evidence (Whitehead Dec., Attachment A) made no mention of a remote point position. However, amended claim 38 merely requires "a constrained

single point fixedly positioned on a structure," with no requirement that it be a *remote* point. Mr. Whitehead's document describes obtaining a location of one or more receivers (Whitehead Dec., Attachment A, ¶ 2, lines 1-2), with each receiver location being constrained relative to the other receiver by a fixed distance and/or geometry and/or common clock. (*id.*, ¶ 2, lines 2-3) The constrained single point limitation would therefore be satisfied by the location of either receiver. Therefore, a "remote" point limitation should not be read into the claim or required to be present in the prior invention disclosure for it to be effective. In addition to the master and slave antennas and receivers, which are constrained on the structure with fixed distances and geometries, other structure-constrained points could be designated as the single fixed point.

Secondly, the evidence of prior invention was rejected because the statement that the ideas expressed have been "kicking around the company for the last several years" was considered insufficient to show that applicants conceived and reduced to practice the claimed subject matter. As noted by the examiner, conception is the mental part of the inventive act and is more than a mere vague idea of how to solve a problem. The means themselves and their interaction must be comprehended also. MPEP 715.07 and *Mergenther v. Scudder*, 1897 C.D. 724, 81 O.G. 1417 (D.C. Cir. 1897). However, Rule 1.131 has separate requirements for "conception" and "reduction practice." Specifically, conception prior to the effective date of the reference must be coupled with due diligence from prior to the reference date (April 7, 2003) to the filing date the application (April 23, 2003, constructive reduction practice). MPEP 715.07

Inventor Whitehead's written disclosure date-stamped January 28, 2003 succinctly and comprehensively documents conception of the claimed invention, i.e. using a redundant array of GPS receivers constrained on a vessel (ship) with large crane and obstructing common view of all available satellites, with bearing to receiver and common clock constraint removing unknowns from position-solution equation. The positioning means, GPS receivers, antennas, common clock, solution computing, constraining mobile structure, signal-blocking structure and bearing from receivers are all discussed, as well as their interactions. In fact, the prior disclosure provides a specific

example involving receivers on both sides of a wall (or ship with satellite-obstructing crane structure) with each receiver seeing only three satellites.

The conception of the claimed invention by January 28, 2003 is demonstrated by the attached table correlating the claim elements with the disclosure. Moreover, conception is corroborated by the sworn statements of both of the inventors, Michael Whitehead and Walter Feller. Although certain ideas may have been "kicking around" for some period, they were concisely and succinctly pulled together in the January 28, 2003 disclosure, conclusively showing conception a few months prior to the reference effective date.

The second Rule 1.131 element, due diligence in reduction to practice, is measured from a time prior to the reference date (April 7, 2003) to the application filing date (April 23, 2003). MPEP 715.07 Filing the application, and thus constructively reducing the invention to practice, within approximately two weeks of the reference date clearly and conclusively demonstrates due diligence. The January 28, 2003 Whitehead disclosure discloses every aspect of the Zimmerman reference being relied upon. Based on the foregoing, applicants respectfully request that Zimmerman 7,027,918 be withdrawn.

Prior Art Distinguished

Claim 38 is the only independent claim remaining in the application. The remaining dependent claims 41, 43, 45 and 46 all depend from claim 38.

Claim 38 calls for a system for determining a GNSS-defined position of a single point on a structure with master and slave receivers and antennas. The antennas are mounted in fixed relation to each other on the structure, which at least partially blocks GNSS signals. An orientation device is also mounted on the structure. Computing means determines the master antenna position using signals from both antennas. The computing means further determines the position of the single point using the position of the master antenna, a known spatial relation of the master antenna to the point and the orientation of the structure.

Claim 38 has been further amended to more specifically point out and distinctly claim what applicants regard as their invention. Specifically, claim 38 is hereby amended to call for the system on a slow-moving marine vessel or terrestrial vehicle with a signal-blocking structure. The antennas are mounted on either side of the mobile structure below the signal-blocking structure. At least one of the antennas sees three or fewer satellites and collectively the receivers and antennas see at least four satellites. The antennas and receivers and the orientation device are all constrained on the mobile structure and provide inputs to the computing means for determining the master antenna absolute position using carrier phase signals for computing a position solution in unison by using a common clock or synchronized clocks. The computing means determines the GNSS-defined absolute position of the single point on the structure using carrier phase with the orientation device removing and unknown from the position solution in the integer and the resolution using a single difference in technique based on the constrained master and slave antennas and the single point.

Dizchavez 6,191,733 discloses equipment with two GPS antennas for determining the position of critical working components, such as a shovel bucket 16, based on sensors for determining the working components' positions relative to the car body 12. However, it does not disclose signal-blocking structure or an orientation device for removing an unknown from an absolute position equation. Moreover, the point of interest (e.g., on the shovel bucket 16) moves relative to the car body 12 and therefore is not a constrained point, as contrasted with applicants' claimed invention.

Wilson 6,292,132 (Figure 2) shows GPS antennas and receivers in a constrained relation on a vehicle for maintaining position information when fewer than four satellites are visible. The system calculates "cone angles" between the antenna-processor pairs sharing a common clock, which are used along with an initial position fix for combining with sensor-generated (e.g., steering wheel input) information for estimating a position. However, the antenna-processor pairs see the same satellite(s) and the system is essentially relative positioning based on the initial point. By contrast, applicants are claiming absolute positioning with the antennas seeing different satellite

constellation subsets and simultaneous processing along with orientation device input for removing unknowns from position-solution equations.

Rorabaugh 6,922, 635 (Figure 4) shows mobile units 101A and 101B on opposite sides of a blocking structure 115 whereby each sees a different subset of satellites. However, the mobile units are unconstrained and positioning is relative, i.e. based on a wirelessly networked group of receivers mounted on respective mobile units. Additional distinctions include the orientation device of applicants' invention, a common clock and position-solution processing in unison for integer ambiguity control utilizing the constrained distance/geometry/clock relations of the antennas and receivers and the single point.

Hanseder 6,253,160 discloses a machine control with antennas and receivers for RTK tool positioning control. However, the purpose of the second antenna and receiver are for calibrating the tool. Figure 2 shows temporary placement of the antenna 13B on the tool (bucket) for calibration relative to the excavator 1. The present invention is distinguished by the constrained antennas and receivers and the single point with an orientation device removing an unknown from a position solution equations.

Dooley 6,618,671 shows a method of determining the relative position of a mobile unit, such as a cell phone. However, it does not involve a mobile structure with multiple constrained antennas and receivers for determining an absolute position.

Toda et al. 6,611,228 show carrier phase-based relative positioning for a marine vessel (Figures 8 A-C) with antennas positioned in constrained relations on opposite sides of the vessel for providing its attitude and relative position. However, there is no disclosure of the antennas seeing partial subsets of the available satellites because of a signal-blocking structure, nor an orientation device providing information for computing a position solution in unison with positioning information from the receivers, nor of unknowns being thereby eliminated from the position solution equations.

Conclusion

Based on the foregoing, claim 38, which is the only remaining independent claim, as amended, distinguishes over the references of record and provides a nonobvious system for determining the absolute position of a fixed point on a mobile structure with a signal-blocking structure preventing at least one receiver and antenna from seeing more than three satellites. The receiver and orientation device information is processed in unison for eliminating unknowns from position-solution equations and for removing integer ambiguity with a single-difference technique.

Therefore, this application is in condition for allowance and notice to this effect is respectfully requested.

The Commissioner is authorized to charge any excess fees, or credit any overpayments to Deposit Account No. 50-3424. The examiner is invited to contact the undersigned by telephone if prosecution of this application can be expedited thereby.

Substance of the October 7, 2008 Interview

1. No exhibits were shown or demonstrations conducted.

2. Claim 38 was discussed.

3. The prior art of record was discussed, including the references specifically mentioned above.

4. Amendments of a substantive nature are reflected in the accompanying amendments to the claims.

5. The general thrust of the principal arguments was that the Rule 1.131 declarations and the accompanying documentation supported conception prior to the effective date of the Zimmerman reference and that the applicants acted with due diligence in reducing the invention practice by filing their application 16 days after the effective date of the reference. However, even with Zimmerman removed, the prior art discussed above would have to be distinguished.

6. No other pertinent matters were discussed.

7. The outcome was that the applicants would consider the references discussed.

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Respectfully Submitted,

Mark Brown

Mark E. Brown
Reg. No. 30,361
LAW OFFICE OF MARK BROWN, LLC
4700 Belleview, Suite 210
Kansas City, Missouri 64112
Telephone: (816) 268-8950
Attorney for Applicants

CONCEPTION OF CLAIM 38 INVENTION 1/28/03

Claim 38 (as amended 10/27/08)	Whitehead Disclosure Date-stamped 1/28/03, Attachment A to Whitehead Rule 131 Declaration.	Comments
A system for determining a GNSS-defined position of a constrained single point fixedly positioned on a structure comprising either a marine vessel or a terrestrial vehicle and including a signal-blocking structure, which system comprises:	Obtain a location of one or more receivers. (¶ 2, lines 1-2) Instead of a wall, this could be a ship with a large crane obstructing the common view to all satellites. (¶ 2, lines 18-19)	Each receiver or antenna location corresponds to a point on structure, but could use any point of reference. Ship with a large crane is slow-moving marine vessel with a signal-blocking structure.
master and slave GNSS receivers;	Using a redundant array of GPS receivers to obtain a location for one or more of these receivers. (¶ 2, lines 1-2)	
master and slave antennas connected to said master and slave receivers respectively and mounted in fixed relation relative to each other on said structure; said structure at least partially blocking GNSS signals from said antennas;	The location of each receiver is constrained relative to the other receiver by a fixed distance and/or geometry and/or common clock. (¶ 2, lines 2-3) Another aspect of the invention is that it allows for computing GPS location in a situation where one or more of the GPS receivers are only seeing a small subset of the available satellites. (¶ 2, lines 9-11) For example, one receiver on one side of a wall [or ship-mounted crane] sees 3 satellites, and another on another side of the wall sees a different subset of 3 satellites. (¶ 2, lines 12-14 and 18-19)	Each receiver includes its own antenna which sees only a subset of the available satellite constellation. Corresponds to structure at least partially blocking GNSS signals from said antennas.

a common clock or synchronized clocks connected to said receivers;	The location of each receiver is constrained relative to the other receiver by a fixed distance and/or geometry and/or common clock. (¶ 2, lines 2-3)	
computing means for determining the master antenna position using signals from both said master and slave antennas;	By receiving GPS signals and computing the solution in unison, we gain the advantage of adding measurements to the equation faster than we do unknowns as compared to the situation of unconstrained GPS receivers for which the location is computed independently for each. (¶ 2, lines 3-7)	
an orientation device mounted and constrained on said structure for determining its orientation;	The location of each receiver is constrained relative to the other receiver by a fixed distance and/or geometry and/or common clock. (¶ 2, lines 2-3) Also, 2 of the measurements provide bearings of the other receiver). (¶ 2, lines 15-18)	Orientation is determined from the fixed distances and/or geometry and/or common clock, which provide bearings between the receivers, which are constrained to the structure and therefore provide its orientation.
said computing means further determining the GNSS-defined position of the single point on the structure using: (1) the position of the master antenna; (2) a known spatial relation of the master antenna to said single point; (3) the orientation of the structure; and (4) integer ambiguity resolution using a single difference equation technique based on said known	The master and slave antennas and receivers use common clocks and are separated by a known distance so you have a total of 6 measurements and 6 unknowns (4 unknowns for location and clock of one receiver, and 2 more for the bearing of the other receiver). (¶ 2, lines 15-18)	Example of the computing means providing a position solution with each receiver receiving signals from only a subset of the available satellites.

constrained spatial relation of said master and slave antennas and said single point.		